AFFORDABLE AND CONVENIENT ACCESS TO EV CHARGING

Solutions for multifamily housing residents

MAY
2025

Plug In America

INTRODUCTION

Affordable and reliable access to charging is crucial for electric vehicle (EV) drivers, whether for powering up for a daily commute, planning a road trip, or topping up while running errands. The Department of Energy estimates that 80% of charging happens at home, usually in a garage or private parking space. But what happens to EV drivers who don't have access to charging at home? Residents of multifamily housing, such as apartments, condominiums, or townhouses, face additional challenges when looking for charging options. Over 30% of housing in the U.S. is considered multifamily, but less than 5% of home charging happens in multifamily housing.

To make the cost and climate benefits of EVs available to residents of multifamily housing, different charging options are necessary, such as shared residential charging, nearby public charging, or workplace charging. Access to convenient, affordable public charging doesn't just benefit multifamily housing residents - it can be useful to anyone who drives, or wants to drive, an EV. As the transition to electric vehicles accelerates, investing in affordable and reliable charging infrastructure is key to ensuring everyone can experience the benefits of driving electric.

According to Plug In America's Annual EV Driver Survey, the single most important economic factor a driver considers in the decision to purchase an EV is access to inexpensive home charging. For drivers who charge at home, powering an EV can cost half as much as fueling a gas car and is more convenient for daily driving. However, a lack of access to home charging can be a significant barrier to EV adoption.

Research shows that public charging stations are more likely to be concentrated in more affluent neighborhoods and that lower-income communities living in both urban and rural geographies tend to be further from public EV infrastructure. Black households in low-income communities usually have to travel further to access EV charging compared to white households. These inequities contribute to a gap in who can benefit from EV adoption.

EV drivers face extra challenges if they don't have reliable access to home charging. In addition to being less convenient, relying on public charging can significantly increase the cost of charging an EV, since public charging can easily be two to three times more expensive than home charging. Installing and operating public chargers is typically more expensive than simply plugging in at home. There are additional costs associated with public chargers that are passed on to EV drivers. A breakdown of the costs associated with home or commercial/public charging stations is listed below, illustrating the additional costs and complexity associated with installing and operating commercial or public charging, often the only option available to residents of multifamily housing.

Costs Associated with Installing and Operating a Level 2 **Home** Charging System Typical Cost ($1,000-$2,000)	Costs Associated with Installing and Operating a Level 2 **Commercial or Public** Charging System Typically ($3,600-$32,700)
Zoning Permit (Location Dependent) Up-front cost of charging equipment Installation cost, which may include: ● Electrician labor and materials ● Panel upgrades and conduit Ongoing costs: ● Electricity at the utility residential rate ● Possible tax on electricity from the electric utility Source: https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf	Zoning Permit (Location Dependent) Up-front cost of charging equipment, including: ● Charging equipment ● EVSE billing equipment (RFID card reader, credit card reader) Installation cost, which may include: ● Contractor labor and materials ● Connecting EVSE to the electrical service ● Panel upgrades and conduit ● Trenching/boring ● Repaving parking ● New electrical service or upgrades (transformers) ● Meeting Americans with Disabilities Act (ADA) requirements ● Traffic protection (bollards) ● Signage and striping ● Lighting ● Permitting and inspection ● Engineering review and drawings Additional capital costs, which may include: ● Hardware extended warranty ● Repair labor warranty ● Land/parking space purchase or lease Operation and maintenance cost: ● Electricity at utility commercial rate ● Demand charges ● EVSE network subscription to enable billing ● Charge management software. ● Management time ● Billing transaction costs ● Preventative and corrective maintenance on EVSE unit ● Repairs (scheduled and unscheduled) ● Possible tax on electricity from the electric utility ● Second tax on electricity from charging provider

One solution Plug In America supports to increase access and affordability of charging is the adoption of EV-friendly building codes in states and cities. By far, the least expensive time to install EV charging infrastructure is during construction. Our EV Building Codes Toolkit offers resources to promote the adoption of EV friendly building codes. But for millions of existing multifamily homes, retrofits and public charging are the only way forward.

Fortunately for current and future EV drivers, there are projects in communities across the country that address these challenges. This report contains twenty case studies representing a variety of solutions for charging access. From chargers on utility poles to a community carshare service, these projects have been implemented in different states, cities, and communities and represent creative, replicable solutions to the current inequity between EV drivers with access to home charging and those without access. Some rely on high-tech innovation, while others focus closely on the needs of underserved residents. Each case study contains a statement of the challenge the project addresses, a brief summary of the project and its implementation, and a few key elements for success. We also compiled qualitative and quantitative data from each case study into a matrix, which easily compares information to help find solutions that may work in your community. Learn about the creative ways that multifamily housing residents can access charging today, and the improvements that companies, municipalities, utilities, and community organizations are making for the future.

NEWLY LAUNCHED INITIATIVES

Two of the organizations featured in this report have recently expanded their charging access programs to new locations in the spring of 2025. We are excited to see their success in improving EV charging and clean transportation access in even more communities.

Curbside charging by it's electric

it's electric, an innovative curbside charging company, has recently unveiled chargers in San Francisco and Detroit. it's electric employs a creative solution to power a charger by tapping into a building in its vicinity. For San Francisco, the new it's electric chargers are the very first curbside chargers in the city, making them a noteworthy achievement for the city. At the ribbon cutting for the San Francisco chargers, one city official remarked, "Not only is this charger not costing city taxpayers money, it's actually generating revenue for our residents through cost-sharing agreements. This is a whole new model for infrastructure. We're [...] thinking about new ways of powering the future that ultimately are going to create more income and more jobs for all of our residents." Tiya Gordon, co-founder of it's electric, emphasized the significance of

the chargers for city residents, “We are honored to reduce the complexities of charging for SF EV drivers and to open the door for adoption for drivers who were hesitant to go EV because they didn’t have anywhere they could charge.” Read our toolkit case study on it’s electric to learn more about their clever charging solution.

Forth Carshare in North Carolina

Forth’s Affordable Mobility Platform is bringing EV car sharing and charging to Charlotte, North Carolina. Charlotte is the first city in the Southeast to join this program, which has a goal of deploying 50 shared EVs and Level 2 chargers in underserved communities by the end of 2025. An affordable housing community in Charlotte will now host two Chevy Bolts available for residents to rent for $5 an hour. This city initiative is part of Carolina Carshare, which is already planning to expand to three additional locations in Charlotte.

DEFINITIONS

This report uses a tagging system to provide a high-level, at-a-glance resource for comparing case study projects. The tags are grouped into three categories representing a project's logistical and operational elements from planning to execution. These tags appear in each case study summary and our matrix, which also contains more comprehensive data for all projects.

Charging Type: Where do vehicles charge?

- **Public:** Chargers are available to any EV driver.
- **Private:** Chargers are for the exclusive use of the building owner or occupant and their invited guests.

Public	Private

Problem Addressed: What does this project improve?

- **Access:** Chargers are in closer proximity to EV drivers who need them.
- **Cost:** Charging is designed to be lower cost.
- **Equipment:** Charging software and hardware are more feasible and cost-effective to install.

Access	Cost	Equipment
		

Solution Type: How is the project implemented?

- **Technology:** A product or service sold by a company that relies on a specific technology.
- **Policy:** A federal, state, or city government program to increase access to charging.
- **Community:** A grassroots, locally-organized approach to increasing access to charging.
- **Utility:** A charging program led by an electricity provider.

Technology	Policy	Community	Utility
			

HIGHLIGHTS

These five charging solutions are highlighted because of their creativity, broad applicability in other communities, opportunity for scaling, and effectiveness in creating access to affordable charging for EV drivers without home charging.

1. **GoForth:** An electric vehicle carshare program and public charging available at affordable multifamily housing developments.
2. **Charge Vermont:** Statewide program offering incentives that cover up to 95% of the total project cost for installing Level 1 and Level 2 chargers at multifamily housing.
3. **Peninsula Clean Energy:** A community choice clean energy provider that recommends and supports installing lower-level home charging.
4. **it's electric:** Simplified public charging using power from neighboring buildings and allowing drivers to bring their own charging cables.
5. **Dunamis Charge:** A charging company that connects underserved communities to affordable public charging by installing charging equipment at local churches and nonprofits.

COMMUNITY SOLUTIONS

GOFORTH

EV Carshare Program

CHALLENGE

Not everyone wants or needs to own a vehicle. Especially in dense urban areas, owning a vehicle can be a liability. Cars themselves are expensive, but registration, financing, inspections, maintenance, repairs, and fuel costs add up. How can low- and moderate-income households access the benefits of a clean vehicle without having to own one?

OBJECTIVES AND SOLUTION

Forth, a nonprofit organization, partners with other local organizations to provide affordable EV car sharing in multiple locations in Oregon, Washington, Idaho, and New Mexico. Local residents can access the cars by downloading an app and making a one-time payment of $10. After completing an orientation, program participants receive a $20 ride credit for their first drive. Rentals cost between $4 and $6 an hour plus tax.

GoForth offers several advantages to drivers and communities. In addition to providing high-quality, reliable private transportation to low- and moderate-income drivers without cars, the charging installations include extra Level 2 charging ports to expand access to EV charging in communities with limited access to home charging. It also offers drivers a low-risk, no-pressure opportunity to try an EV locally and see how it can meet their transportation needs.

This program is designed to provide lower-income communities with the cost and air quality benefits of clean transportation. It intentionally prioritizes vehicles and charging at affordable housing developments. The program has been so successful that the model is expanding to additional locations in participating states and new locations such as North Carolina and Missouri. GoForth is built on support from local electric utilities, the U.S. Department of Energy, foundations, municipalities, and state agencies.

Elements for Success

- The GoForth Carshare program offers **extremely low-cost** private transportation options in late-model zero-emission vehicles. Forth is able to keep costs low through grants they receive.
- **Utility and federal partnerships** have helped the program get started and expand.

REFERENCES

- GoForth Carshare Program
- Albuquerque brings the energy to affordable transportation
- GoForth Guidebook

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Cost, Equipment	 Community

Charger type: Level 2

DUNAMIS CHARGE

Community-Driven Charging

CHALLENGE

Historically underserved communities, including Black, Brown, and rural communities, can face additional barriers to access to electric vehicles and charging infrastructure. Prospective EV drivers often cite the lack of access to charging as a primary concern. How can historically underserved communities access and benefit from EV charging?

OBJECTIVES AND SOLUTION

Through their creative Communities in Charge program, Dunamis Charge connects community organizations such as churches and nonprofits with public EV charging stations for free. The program works to bring charging access and affordability to economically disadvantaged communities while empowering community churches and organizations to operate as charging hosts. In partnership with DTE Energy, Communities in Charge deploys public Level 2 charging in locations where residents often lack access to charging and have less exposure to EVs. The chargers are available to area residents 24 hours a day, seven days a week, and can serve as a source of revenue for churches and nonprofits. The chargers are situated in high-traffic areas for people to know they can charge when needed.

DTE Energy offers rebates through Communities in Charge for charger costs, necessary infrastructure upgrades, and installation. The program now has about 40 sites (each with multiple charging ports, for a rough estimate of at least 80 chargers) online. The churches and nonprofits, mainly located in Detroit, MI, receive training and marketing materials through the program. Dunamis Charge also partnered with ChargerHelp to maintain the chargers.

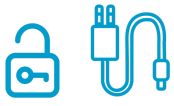
Each site host determines the cost of each charging session for EV drivers. Some hosts charge drivers for each session, others provide free charging, and some discount the cost of charging for drivers who use their stations. What's been key is the process of working in partnership with each community host to knowledge-share and understand what information they need.

Elements for Success

- The **utility partnership** with DTE Energy enabled Communities in Charge through a $1.5 million investment that provides rebates to cover costs for the program's community hosts within DTE's service territory. This capital investment not only provides access to charging in communities but also raises awareness in the community about EV technology more broadly to further encourage EV adoption.
- Communities in Charge relies on **diligent, comprehensive outreach** led by messengers from within the community. Leaning on their team's strong ties to the faith community, Dunamis Charge generated interest in the program by calling each church in the area. This demonstrates the need for considerate and comprehensive outreach from trusted sources.

REFERENCES

- Home EV Charger Rebate | DTE Energy
- The EV charging company that runs on faith - E&E News by POLITICO
- Dunamis Charge

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Equipment	 Community

Average charging cost: $1.50 per hour

ECOLOGY ACTION

EV Charging Incentives and Installation Assistance

CHALLENGE

One challenge for owners and managers of multifamily housing properties in installing electric vehicle (EV) chargers is that the process can require many complex steps, from conducting feasibility assessments to obtaining permits and managing the installation. It can also be challenging to identify and apply for relevant incentives at the federal, state, and local levels. How can property managers find an easier way to install chargers and plan for the future?

OBJECTIVES AND SOLUTION

Ecology Action provides full-service support for charging installation at small businesses and multifamily housing with a focus on community engagement and continued outreach. Ecology Action's unique standpoint as a nonprofit organization committed to equitable climate solutions enables itthem to support communities before, during, and after EV charger installations. Through their *EVs for Everyone* project, the organization hosts ride-and-drive events and helps residents of the central California coast make the decision to go electric. To give residents more opportunities to charge at home or nearby, they offer full-service assistance for installing EV chargers, which is offered at a reduced cost or free for some property owners.

Ecology Action helps property owners find and secure relevant EV charging incentives and rebates. It also conducts a feasibility assessment and provides a customized project design. Then, it assigns an EV Charging Project Manager to assist with the entire installation process, including permitting and on-site management.

In response to the needs and capacities of low- to middle-income resident communities, Ecology Action often recommends lower-power Level 1 or Level 2 chargers, which cost less and provide just the right amount of power for residents. They also provide training both for property owners installing chargers and for the community as a whole. The organization has received funding from the California Energy Commission and the local electric

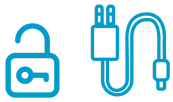
utility PG&E. Through this program, property owners install EV chargers for around half the cost of electric utility programs. Ecology Action's focus on equity, community outreach, and cost savings makes this project impactful for EV drivers who live in multifamily housing.

Elements for Success

- The organization's feasibility studies put **no pressure** on building owners to purchase specific chargers, so they can work to find charging solutions that work best for their buildings.
- **Community outreach,** specifically to low- and middle-income residents, is a key component of this program, which works to create a supportive environment for EV drivers and those looking to switch to electric. Ecology Action also offers bilingual assistance to reach even more community members.

REFERENCES

- EV-Charging Installation & Rebates in California | Ecology Action
- EVs for Everyone

Tags		
Charging type	Problem addressed	Solution type
 Public or Private	 Access, Equipment	 Community

Charger type: Level 1 and Level 2

ELECTRIC NATION

Upper Midwest Inter-Tribal EV Charging Community Network

CHALLENGE

Access to charging is essential for drivers of all kinds. However, affordable access to clean transportation can face additional challenges for underserved tribal communities, including power availability, investment potential, and community buy-in. What can we achieve with intentional, proactive community engagement?

OBJECTIVES AND SOLUTION

The Upper Midwest Inter-Tribal EV Charging Community Network, referred to as "Electric Nation," is a "whole of economy approach"[1] to provide access to clean and affordable transportation for underserved tribal communities. Electric Nation's goals include increasing access for communities to essential services and increasing collaboration across the upper Midwest region tribal communities.

Electric Nation is a growing regional community-led EV charging initiative. It is a holistically designed project led by Native Sun Community Power Development (NSCPD) and Standing Rock (SAGE) Renewable Energy Power Authority and in partnership with the American Lung Association, Minnesota Center for Energy & Environment, Minnesota Pollution Control Agency, Xcel Energy, Ottertail Power, Minnesota Power, and Zef Energy.

While the project is not exclusive to multifamily housing (MFH) residential charging, it is notable for its structure and approach to curating investments in EV charging, led by community-based decision-making and community priorities. Currently, in the middle of its three-year grant cycle, Electric Nation is building its foundation. Specific project goals include:

- **Install 55 direct current fast-charging units** on Tribal lands and connect them to main travel routes and other Tribal communities.
- **Install 60 Level 2 EV supply equipment points** at community gathering spots, including grocery stores, multifamily housing, Tribal colleges, casinos, and other destinations.
- **Deploy EVs in Tribal fleets**, including 16 light-duty EVs, an electric shuttle, and two electric school buses.
- **Implement 52 educational sessions** for communities about EV usage and benefits.

[1] Interview with Robert Blake, Native Sun, December 2024

Elements for Success

- **Community leadership** and **decision-making** ensure that investments made through Electric Nation are well-designed for and supported by the community. Too often, projects intended to benefit communities are initiated without their input and result in a mismatch between the needs and desires of the community and project output. Electric Nation offers a model for community-centered planning that focuses on the needs of the community. When implementing solutions intended to support MFH residents in their mobility needs, robust community engagement is needed to ensure the solution meets the need. The aesthetics of EV chargers emerged as a key concern for community members in feedback sessions. Electric Nation implemented this feedback by partnering with Indigenous artists to make the infrastructure inclusive and welcoming to ensure the usage of the stations.
- **Distributed energy resources (DERs)** were essential to support chargers and offset the cost of each station. Co-locating DERs with EV chargers enabled charger installation across varying sites by avoiding high demand charges and expanding potential site locations.
- **External funding** has supported the creation and ongoing growth of this project. Cost-sharing among the project partners supports the remaining costs not covered by the federal grant.

REFERENCES

- Tribal nations, utilities partner on EV access and reliability in the Upper Midwest
- Our Work | Native Sun Community Power Development – Minneapolis, MN
- The unique role some Tribal nations are taking in the EV transition - Plug In America
- Native-led EV initiative launches by distributing millions of dollars worth of vehicles to tribal communities | MPR News
- Mobility Equity Framework: How to Make Transportation Work for People - The Greenlining Institute

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Cost, Equipment	 Community

Charger type: Level 2 and fast charging

POLICY SOLUTIONS

CHARGE VERMONT

State Incentives for Multifamily Housing

CHALLENGE

Electric vehicles can lower transportation costs and save consumers money. Still, if you live in multifamily housing and don't have access to home charging, these benefits may be diminished by the higher cost of using public chargers. How can these EV drivers access convenient and low-cost charging options?

OBJECTIVES AND SOLUTION

The State of Vermont developed a program to subsidize charging at multifamily housing across the state. Charge Vermont is funded by the state and administered by Vermont's largest electric utility. Essentially, this program provides free (or almost free) installation of Level 1 and Level 2 chargers in multifamily housing. It offers up to 90% of the total project cost for market-rate housing installations and up to 95% of the total project cost for projects with a minimum of 50% affordable housing units. Federal, state, and utility incentives can all be used as a match. The program was initially funded by state appropriations but is now funded by EV registration fees.

Vermont is considered the most rural state in the U.S., with almost 65% of its population living in rural areas. About 23% of Vermont's housing is multifamily, and because Vermont is so rural, multifamily housing, including manufactured home parks, isn't necessarily located in cities.

Many Vermonters living in multifamily housing still have long commutes. Beginning in 2022, the Vermont Department of Housing and Community Development recognized a need for affordable and convenient home charging access for drivers living in multifamily housing. It developed a $1 million pilot to test how EV charging solutions could work for multi-unit property owners and residents. The pilot used grant recipient interviews, cost assessments, station use reporting and analysis, and case studies to develop best practices. The pilot has increased EV charging access to residents in 28 multifamily properties, with a total of 78 charging ports contracted. More recently, the VT Legislature passed a bill appropriating $7 million for the Charge VT program based on the learnings of the pilot.

One program requirement is to ensure that charging is distributed throughout the state, so no county can receive more than 10% of the available funding. Currently, counties with more urban areas are fully subscribed, but funding is still available in counties with more rural areas. Property managers interested in participating can fill out a simple online application form and participate in a pre-screening call. Charging equipment installers can be selected by the property manager or from a list of installation partners provided through the program. The equipment must be maintained for at least five years and must be networked equipment if the chargers are available to the general public. Equipment does not have to be networked if charging is restricted to residents only, which may keep costs lower for home charging.

Another unique and important feature of the program is that, through a partnership with Green Mountain Power, the state's largest electric utility and program administrator, building owners can access a significant portion of the funding incentives *before* they start work. This is critical for smaller property owners who don't have easy access to capital and can make it financially feasible for them to move forward with charging projects.

In 2024, the State Legislature passed a bill imposing additional registration fees on EVs. Unlike most states that use EV fees for road maintenance, Vermont is using these fees to fund this program, thus expanding access to charging for residents of multifamily housing.

Elements for Success

- Incentives can be stacked with utility programs, which are widely available in other states, and federal tax credits, making charger installations **inexpensive or free**.
- The program leverages a **utility partnership** to offer the bulk of the incentive before construction begins, covering the upfront investment that often deters property managers from installing EV chargers.

REFERENCES

- Charge Vermont EV Chargers for Multi-unit Residences

- [Multiunit EV Charging Incentive Program]

Tags		
Charging type	Problem addressed	Solution type
 Public or Private	 Access, Cost	 Policy

Charger type: Level 1 or Level 2

CITY OF CAMBRIDGE

Sidewalk EV Charging

CHALLENGE

An increase in electric vehicle adoption in cities can come with a problem: where do those new EV drivers charge their vehicles? Infrastructure projects take time, and installing EV chargers in cities is no different. Long-term solutions can be implemented, but what do EV drivers do in the short term while they wait?

OBJECTIVES AND SOLUTION

In Cambridge, EV drivers struggling to find charging solutions were given a way to temporarily meet their charging needs. Residents can apply for a permit to get a mat that covers a cord they run across the sidewalk to charge their cars on the street.

If approved for a permit, they can also get a 9-foot-tall swing arm that extends above the sidewalk. The charging cable must be connected outside and can only use 120 volts. Furthermore, the cord can be out for 12 hours a day or less and has to be removed from the sidewalk when not in use. It is important to note that this is intended to be a stop-gap solution until long-term solutions are implemented and more public charging stations become available for Cambridge drivers.

Elements for Success

- While long-term solutions require more delicate planning and time, short-term solutions like these simply need to give drivers the tools to charge. Cambridge's plan matches a need with a **rapidly deployable** solution. This specific plan comes with some restrictions, but those restrictions are worth it for the convenience of being able to charge your EV whenever you need to.
- This policy solution **recognizes the urgent needs** of residents without home charging and gives them an easy and convenient solution.

REFERENCES

- Cambridge, Massachusetts legalizes sidewalk electric vehicle charging
- City of Cambridge Announces Electric Vehicle Charging Pilot Program

Tags		
Charging type	Problem addressed	Solution type
Private	Access, Equipment	Policy

Charger type: Level 1 charging

CITY OF ANN ARBOR

Commercial EV Charger Program

CHALLENGE

In order to provide EV chargers in a multifamily housing property, it is often the property owners and managers that need to be convinced. What can be done to make it as easy and inexpensive as possible to install and manage EV chargers in multifamily housing buildings?

OBJECTIVES AND SOLUTION

In Ann Arbor, Michigan, the Commercial EV Charger Program will provide commercial and multifamily property owners with up to four free Level 2 chargers in their buildings. These chargers are FLO CoRe+ chargers, which come with a 5-year performance warranty and a 5-year software package. Charger accessories can also be included, depending on the building's needs.

Multifamily properties with at least five units are eligible to apply for the grant, which is not fulfilled until the properties can provide evidence that the site is ready for EV charger installation. Applicants are prioritized based on the building location and expected charger demand within the building. Ann Arbor developed a GIS map with scores that take into account the density of multifamily rentals, access to public transportation, and local EV charger availability.

The grant stipulates certain parameters for property managers. These include ensuring the cost of charging does not exceed the cost of electricity (plus a transaction fee), allowing full public accessibility to EV chargers, maintaining 90% uptime for the chargers, and more. Building owners must allow the City of Ann Arbor to inspect the site and must report charger data to the city twice per year. After the 5-year software package and warranty expire, grant recipients will be responsible for their own software and maintenance costs.

Elements for Success

- Ann Arbor's Commercial EV Charger Program **removes financial barriers** for property managers and owners to deliver a service to drivers inside and outside their complexes.
- The program also sets safeguards that **protect EV drivers** by ensuring they are not overcharged for electricity. These multifamily housing residents can now pay the same rates for charging as other drivers who charge at home.

REFERENCES

- Ann Arbor's NEW Commercial EV Charger Program
- FLO Chargers Power Ann Arbor's Commercial Charging Program
- Ann Arbor offers free electric vehicle chargers for commercial and multifamily buildings

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Equipment, Cost	 Policy

Charger type: Level 2 charging

CITY OF BOSTON

Public Curbside EV Charging

CHALLENGE

While public EV chargers are often theoretically accessible to everyone, they can be located in parking garages that require EV drivers to pay entrance fees. So, how can a city ensure that everyone can fairly access EV chargers without access to a home charger?

OBJECTIVES AND SOLUTION

“Recharge Boston: Boston’s Zero Emission Vehicle Program” is an initiative in the capital of Massachusetts designed to ensure that every household in the city is within a 10-minute walk of a publicly available EV charging station. To ensure this can happen, the city is installing 250 curbside EV chargers across the city over a 2-year period.

it’s electric and Greenspot are two private-sector companies that are installing public EV chargers in Boston to provide curbside charging at no cost to the city. it’s electric will install Level 2 charging posts, which get power from nearby private buildings. Buildings are compensated for energy usage, and property managers and owners can sign up to become property partners. EV drivers will then be able to sign up for it’s electric and receive a portable EV charging cord which can be used to charge at any of it’s electric’s chargers in Boston.

Greenspot will also install curbside chargers and manage its charging network free of charge for the city of Boston. It will charge drivers for electricity to generate revenue to offset the cost of installing, owning, and operating the chargers. The average charging cost for drivers is expected to be about $0.35/kWh, and drivers can pay for the charge via a mobile application or using their credit/debit cards.

The city of Boston keeps a publicly available map of the chargers currently available to residents, and chargers that are coming online soon, to keep residents informed and updated.

Elements for Success

- The use of **surplus power from private buildings** reduces the need for utility upgrades and ensures the project is replicable and scalable.
- The solution's model ensure the plan comes **at no cost to the city itself** and even incentivizes property managers and owners to make extra income by providing a home base for electricity.

REFERENCES

- Boston is going big on installing curbside EV chargers
- Curbside EV Charging
- Recharge Boston: Boston's Zero Emission Vehicle Program
- Boston installing curbside EV chargers in neighborhoods, property owners make profit

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access	 Policy

Charging cost: $0.35/kWh

TECHNOLOGY SOLUTIONS

GREEN EDGE TECH

Equitable EV Charging Access

CHALLENGE

Convenience is key for EV charging. In dense urban areas where installing home chargers is impossible or cost-prohibitive, drivers need a different option. Curbside charging close to residential and commercial areas is the best solution - the cost is shared among community members, and residents can ideally walk five minutes or less to charge their cars. Location is also a key element: data-driven location scouting can find underserved community areas where public chargers are most needed and appreciated. How can cities install public charging that is accessible and affordable for all residents?

OBJECTIVES AND SOLUTION

Green Edge Tech, a green technology company based in Pittsburgh, PA, assists municipalities with installing and operating accessible and convenient public charging. The company's pilot project in Swissvale (a borough of Pittsburgh) resulted in five currently active public chargers. The decision to install chargers in this location was informed by equity-minded location scouting, which aims to put chargers in areas with lower-income residents who are less likely to have access to home charging. Green Edge Tech's location scouting has been supported by students at Carnegie Mellon University's Heinz College of Information Systems and Public Policy. Through two capstone projects, students built a mapping system with layers for average household income, points of interest such as stores and places of worship, and the percentage of the population that is non-white. The students used this demographic data to create Equity Scores, which can be customized to give certain demographic factors a higher priority over others and represent zones within a five-minute walking distance. Students also worked on an additional capstone project to calculate equitable cost structures for charging while accounting for the cost of ownership and demand costs from utilities.

As a technology-agnostic company, Green Edge Tech analyzed several manufacturers and selected 6.2kW Level 2 chargers for the Swissvale site. The local electric utility's

pricing structure changes dramatically based on charging demand, so determining the price of charging has been challenging. The municipality owns the charging equipment, and after Green Edge Tech's lengthy 10-year contract with their local utility, the city will own the entire system. The city received the chargers for free, with some funding from Driving PA Forward, a grant and rebate program designed to improve air quality. Green Edge Tech hopes to incorporate equitable location scouting into more partnerships with municipalities in the future.

Elements for Success

- **Location scouting** is critical for determining the most useful and practical charging area, using demographic information and points of interest.
- **Grassroots community engagement** ensures that chargers are desired and placed in approved locations so that their impact is maximized.
- **Data collection and analysis** help to determine the current impact of the project and lessons for future installations.

REFERENCES

- Green Edge Tech
- Green Edge Tech / CMU Heinz College of Information Systems and Public Policy Capstone Presentation

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access	 Technology

Average charging cost: $1 to start, $0.35/kWh after

EVMATCH

Charger Sharing

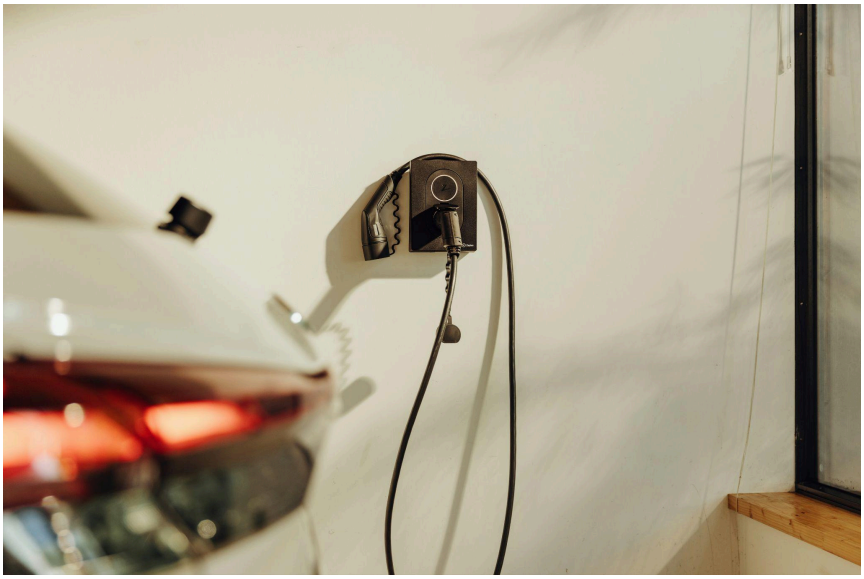
CHALLENGE

Private home EV chargers can be used more efficiently. Whether it be because someone is away at work, on a trip, or just not using their home charger at any given time, those chargers can lie dormant for periods of time during a day or week. How can existing infrastructure be used to provide more charging opportunities for those without access?

OBJECTIVES AND SOLUTION

Even the most avid home charger users do not charge their vehicles 24 hours a day, seven days a week. EVmatch is a mobile app that connects people with EV chargers to people who need EV chargers, allowing users to rent out chargers whenever they are available. Those renting out their chargers can dictate when their chargers are available for use.

Charging hosts can also decide the price of charging, which allows them to either cover the cost of charging or profit from the charge. EV charging seekers can compare different prices and available times to determine their best charging option.



Once a charging session has been completed using an EVmatch charger, hosts can either request a direct payout or they can convert those earnings into EVmatch credit. This credit can then be used to charge at other EVmatch stations.

Elements for Success

- EVmatch represents the **direct-to-consumer option** for EV charging. Users of EVmatch do not have to wait for their municipalities to create EV charging solutions or companies to create more charging access. They can simply use the EVmatch platform to find charging that already exists when they need it.

- This solution also **makes private charging as efficient as possible**. Hosts can maximize the time their chargers are used, which can help other residents within their local communities.

REFERENCES

- Earn Money Sharing Your Home EV Charging Station
- EVmatch: A simple, low-cost way to monetize your charging stations

Tags		
Charging type	Problem addressed	Solution type
 Private	 Access	 Technology

Number of active chargers: over 1,000

STAK MOBILITY

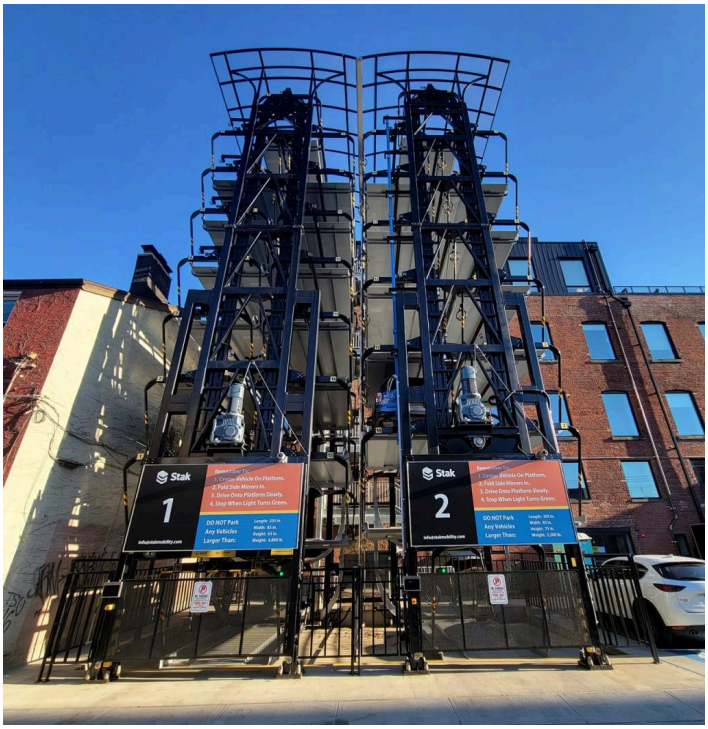
Pittsburgh Charging Carousel

CHALLENGE

Charging and parking can be difficult for EV drivers in cities. The city of Pittsburgh aims to reduce on-road transportation emissions by 50% and is working to increase vehicle electrification to do so. Pittsburgh also wants to revitalize its downtown Strip District and create more space for local businesses to grow. How can cities use their limited parking space efficiently while providing charging access for EV drivers?

OBJECTIVES AND SOLUTION

Stak Mobility has developed an open-air vertical parking carousel in Pittsburgh, with other structures in Healdsburg, CA, Gainesville, FL, and Charleston, SC. Each of the 42 parking spaces available in the carousel is outfitted with a Level 2 EV charger. While users don't necessarily need to have an EV to use this parking carousel, the structure provides a convenient way for EV drivers to find charging. It can provide charging confidence to curious consumers about the options available.



Drivers who want to park in the carousel simply use the Stak Mobility app to find a spot and reserve parking. They confirm through the app and use it to get their car once it's ready. While some structures have had a valet on-site, this particular carousel is self-service. Drivers pay a monthly subscription for parking and charging, which varies based on the car size.

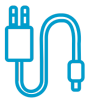
Stak Mobility's carousels not only provide charging but also work much more efficiently than the average parking garage. This specific solution freed up about 10,000 square feet of space within the building that can be used for commercial and retail space for local businesses.

Elements for Success

- Stak Mobility has used **private investment** to create an EV charging solution that uses space vertically rather than horizontally. EV drivers get more parking space with chargers equipped at each one. The cities targeted for these projects benefit from more space for local businesses and attractions, which can boost their local economy.
- This technological solution **provides more charging opportunities** in areas where multifamily housing is prevalent and makes charging easy for residents without dedicated parking spaces.

REFERENCES

- Stak Mobility
- Stak Mobility to Launch Second Mobility Hub in Pittsburgh; Sees Continued Momentum Across the US
- In Pittsburgh, this vertical parking carousel can fit 42 cars - and offers EV charging for every one
- Stak in the News
- Unique 'carousel' parking lot accommodating electric vehicles in Strip District

Tags		
Charging type	Problem addressed	Solution type
 Public	  Access, Equipment	 Technology

Charging cost: Monthly subscription

REVEL

Public EV Charging and All-Electric Rideshares

CHALLENGE

Installing EV charging in cities can be extra challenging because they're expensive, and many drivers who would use them most don't yet have EVs (likely because they don't have access to charging). This catch–22 makes it difficult to find public charging in cities. For rideshare drivers, who are high-mileage drivers, this lack of access can make driving an EV for rides impossible. How can urban drivers, especially rideshare drivers, be supported in their charging needs?

OBJECTIVES AND SOLUTION

Enter Revel. Revel is an EV charging company that started installing public charging to provide access to charging in dense urban areas that don't have ample public charging and where drivers don't have access to charging at home. Revel has taken a novel approach to funding their charging projects: building an all-electric rideshare platform.

Many rideshare drivers operate in cities where charging infrastructure is sparse, and the lack of charging stations close to popular pickup and drop-off locations can lead to long wait times, inefficient routes, and unnecessary downtime. For drivers who rely on EVs, this barrier makes it difficult to maintain an effective, profitable work schedule.

Revel's concept to leverage its rideshare platform to deploy public EV charging is the first of its kind in the US. These charging stations are designed to serve electric vehicles used in ridesharing, ensuring that drivers can quickly and efficiently recharge their EVs during breaks without disrupting their schedules. The chargers are open to the public 24/7. Revel's charging stations are equipped with DC fast chargers rated at 150kW and 320kW, depending on the site. Revel chargers have both NACS and CCS connector types to ensure all drivers can charge their vehicles.

Revel's fleet of electric vehicles for rideshare services is available to provide an accessible option for drivers. Revel partners with platforms like Uber to provide discounts on EV charging

and enable drivers to utilize the Revel charging network as part of their daily routines, further incentivizing EV adoption among those in the rideshare industry.

Revel is currently the largest provider of public EV charging in New York City. Building on their momentum, Revel has secured a $60 million loan from the state of New York to triple their public EV charging capacity in NYC.

Elements for Success

- Revel's decision to build an all-electric **rideshare platform** and ability to partner with popular rideshare services like Uber ensures that drivers can easily incorporate the use of Revel's vehicles and charging infrastructure into their workday.
- This integration provides drivers with a **hassle-free solution** that makes it easier to adopt electric vehicles.

REFERENCES

- Revel
- NYC's fastest EV charging company, Revel, opens its first West Coast station
- Revel and PANYNJ Open New EV Charging Station at JFK
- New York loans Revel $60M to expand NYC public EV charging

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access	 Technology

Average charging cost: $0.54/kWh

SWTCH ENERGY

Enhanced EV Charger Management

CHALLENGE

Installing EV chargers in multifamily properties can often require expensive electrical upgrades, especially when retrofitting existing buildings with limited panel capacity. How can technology support EV charging by capping additional load to save on costly infrastructure upgrades? How can they scale their charging needs effectively?

OBJECTIVES AND SOLUTION

SWTCH Energy provides multiple solutions designed to accommodate EV charging in multifamily properties. Their product SWTCH Portal™ is a customized dashboard that gives building managers real-time information and control over rate structures, turn-key billing, loitering enforcement, and access control. This product makes charger operation simple for property managers, especially those with many chargers at one site. It is a tailored solution designed for the needs of each specific property. Another product that SWTCH offers is SWTCH Control™, an advanced load manager that maximizes the number of chargers that can be installed while avoiding infrastructure costs resulting from increased demand.

One example of advanced load management is at the Lofts at Beacon, located in Beacon, New York. When residents started to request EV charging as new units were being added to their property, the building installed 10 EV chargers that all existed on individual circuits. By using SWTCH Control™, which provides continuous monitoring of chargers, the property could expand to up to 40 charging units with no need for electrical upgrades. With this much capacity, even people who don't live in the Lofts can use the chargers..

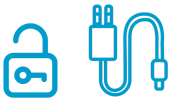
With a convenient app and platform for both users and operators and 24/7 support available to its users, SWTCH Energy improves efficiency for property managers and residents to ensure EV charging can meet current and future demand.

Elements for Success

- SWTCH's **tailored and comprehensive portal** allows building managers to observe and control their chargers in real time, making the operation more efficient and beneficial to their properties
- **Load management software** is a very scalable solution that allows buildings to expand their EV charger capacity while maintaining cost-effectiveness.

REFERENCES

- Multifamily EV Charging
- The Lofts at Beacon Future-Proofed their Building & Business with a Scalable EV Charging System
- Multifamily Case Study: Condo adds 21 EV charging stations and avoids $24K in electrical upgrades

Tags		
Charging type	Problem addressed	Solution type
 Public or Private	 Access, Equipment	 Technology

Average charging cost: $0.39/kWh

FERMATA ENERGY

Vehicle-to-Grid Charging Pilot

CHALLENGE

Demand for electricity from the grid fluctuates throughout the day, which causes prices to fluctuate as well. Electric vehicle (EV) batteries can charge and store energy when demand is low and feed it back into the grid when demand is high. How can we leverage this unique EV capability for multifamily housing residents?

OBJECTIVES AND SOLUTION

BlueHub Capital, a nonprofit community development financing organization, saw an opportunity for affordable housing developments to provide EV charging for residents while earning credits from their local electric utility. They partnered with Fermata Energy, a company that makes a bi-directional EV charger that can transport electricity between a vehicle and the grid (which is called vehicle-to-grid or V2G charging). This utility partnership allows EVs at multifamily residences to support grid efficiency while earning revenue to help lower the costs of charger installation and the electricity for charging. The first location selected for this V2G pilot was the Girls Latin Academy Apartments located in the Dorchester neighborhood of Boston, MA, and managed by the Codman Square Neighborhood Development Corporation.

Since June 2023, a resident at this affordable housing complex has been able to rent a Nissan LEAF and charge it at home using Fermata Energy's 20kW bi-directional charger. The local electric utility, Eversource, notifies Fermata Energy of an 'event' when they need additional power and electricity will be discharged from the car back into the grid. These 'events' are usually in the evenings in the summer, corresponding with peak energy demand. Eversource pays Fermata Energy $200 per kW discharged during an 'event'. If the car is plugged in for a total of 40 to 60 events that last 2 to 3 hours each, it could earn up to $4,000 per summer, which could offset electricity costs for charging.

This project required an upfront loan from BlueHub Capital for the building's charger installation. The driver receives free charging and discounts on their car lease from

Enterprise and insurance. In the future, the pilot could be expanded to include more drivers who could bring their own cars, more buildings that can earn revenue, and software that can manage the load of each vehicle in a bank of chargers. For now, the participating driver appreciates the opportunity to save money and build a more sustainable future.

Elements for Success

- The **upfront loan** provided by BlueHub Capital made this project possible for an affordable housing development that may not have otherwise been able to provide EV charging for residents.
- The **utility partnership** between Fermata Energy and Eversource was critical for the installation process and the bidirectional charging software, which allows credits for energy discharged back into the grid during peak 'events.'

REFERENCES

- Electric Vehicle Pilot - BlueHub Capital
- First-in-Nation Pilot to Provide Affordable Access to EV
- How V2X works - Fermata Energy

Tags		
Charging type	Problem addressed	Solution type
 Private	 Access, Equipment, Cost	 Technology

Charger type: DC fast charging

AMPERAGE CAPITAL

EV Infrastructure Investment

CHALLENGE

Multifamily building owners are often reluctant to install EV chargers because of the high upfront cost, building upgrades, and maintenance required. Tenants who live in these buildings may not be willing to drive an EV if there are no charging stations available. Even if there are no current tenants who drive EVs, multifamily buildings need to plan for the future and install charging stations as a basic service for residents. How can building owners and managers be motivated and supported to build EV infrastructure for residents?

OBJECTIVES AND SOLUTION

Amperage Capital has an innovative solution to this problem. Based in Dallas, Texas, Amperage Capital is an infrastructure investor and operator with a goal to close the gap between EV infrastructure demand and investment. Amperage knows that EV adoption will continue to accelerate, presenting a huge opportunity for long-term investment in charging infrastructure. Amperage Capital will pay 100% of the cost of charging equipment and installation, including Level 2 and DC fast chargers, and offer property owners a revenue share, which brings in extra income. The installation process is quick and simple. Chargers are assembled off-site and installed in a few days, minimizing on-site work and utility upgrades.

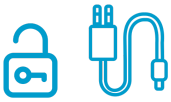
For EV drivers, the process is even easier. Each tenant is assigned a parking space with a charger for their exclusive use. They activate the chargers using their phone or RFID card, which they receive after signing a lease agreement. Tenants make a small monthly payment for the cost of charging through an app. Amperage owns and maintains the charging stations, and property owners collect a share of the revenue. Amperage Capital works to help all kinds of buildings, including retailers, hospitals, city governments, and parking garages, provide reliable and accessible EV charging, and keep up with growing demand.

Elements for Success

- **Long-term, upfront investment** makes charging infrastructure installation possible for more multifamily building owners and residents and ensures buildings will be ready for future tenants who drive EVs.
- The **simple process** for residents to reserve parking spaces with EV chargers and pay a monthly fee opens up the opportunity to drive an EV to more renters.

REFERENCES

- Home - Amperage Capital
- Driver Home - Amperage Capital

Tags		
Charging type	Problem addressed	Solution type
 Private	 Access, Equipment	 Technology

Charging cost: Small monthly subscription

VOLTA CHARGING

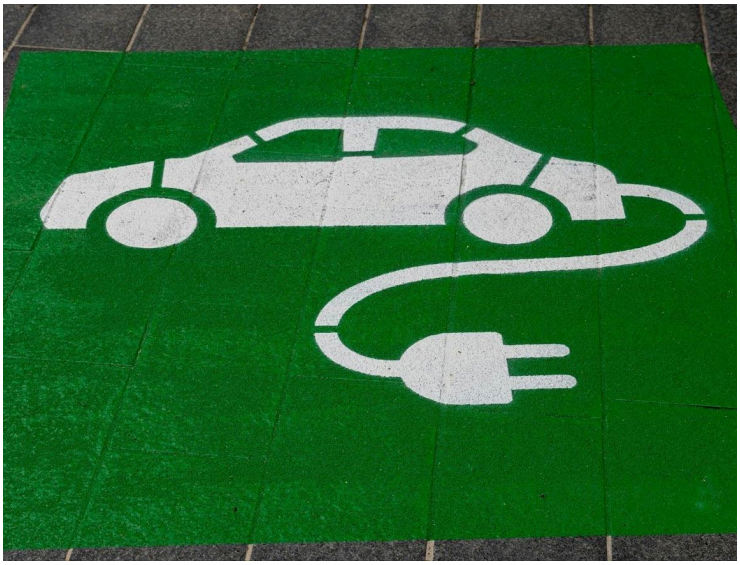
Convenient Public Charging

CHALLENGE

Public charging is often more expensive than home charging and requires smart location siting to ensure it can serve drivers' needs. How can public charging be affordable and convenient for drivers who depend on public infrastructure to get a charge?

OBJECTIVES AND SOLUTION

Shell Recharge's Volta EV Charging Network has over 2,000 stations across the country, which typically are available at no cost to an EV driver. Volta installs and manages its Level 2 chargers, which are equipped with a universal connector to ensure that any EV can use its network.



Not only are Volta chargers free, but they're also generally installed in easily reachable locations. Whole Foods is an example of this; the chain hosts at least 37 Level 2 Volta chargers in their parking lots across the country. This allows for EV drivers around the country to top up their battery level while getting groceries they need.

Volta chargers exist at locations like this nationwide, enabling convenience in public EV charging. Lindsey, an EV driver in Texas, provided one example of this in her life. "I absolutely love when a Volta charger is free at the ice rink, so I can top up while I'm practicing. I don't have a charger at home, so I have to rely on public chargers for all my power needs. The Volta chargers save me time and are conveniently located at a place I already visit once a week."

Volta's free-of-charge service can exist because of the business model it uses. The chargers feature digital screens that display advertisements. As long as Volta can make revenue from advertisements, then they can offer their charging at no cost to the driver.

Elements for Success

- The most appealing feature of the Volta charging network is that many of its chargers are free to the driver. Volta explored **creative revenue paths** with its chargers, which allow it to generate revenue without the driver having to pay for charging.
- Beyond the cost, the chargers are available at **convenient locations** that can fit into a consumer's routine. By focusing on places that EV drivers are going to be anyway - such as a grocery store - Volta is making their chargers accessible.

REFERENCES

- Volta EV Charging Network
- Startup Volta will charge your electric car for free – seriously

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Cost	 Technology

Average charging cost: Free

IT'S ELECTRIC

Curbside charging with a twist

CHALLENGE

For EV drivers in cities, charging can be difficult to access for various reasons. Installing chargers in cities can be time-intensive and expensive, or they can be challenging to site and get a utility connection to the grid. Even once installed, traditional chargers are bulky and may not blend well with streetscapes. How can cities scale rapid, cost-effective charging?

OBJECTIVES AND SOLUTION

it's electric, a New York-based company, has leveraged a creative and simple solution to power a charger by tapping into excess electric capacity in a nearby building. This approach to using existing infrastructure and grid connections to power curbside chargers across cities can save time and money, enabling rapid EV charging installation at scale. it's electric developed public charging with the intention of it being a permanent replacement and solution for a home charger.

it's electric partners with property owners seeking to install chargers on their property's curbs. it's electric powers their chargers using the spare electrical capacity from existing buildings, which they confirm with the property owner. During their short, two-day installation process, they run a shallow conduit from the building's electrical panel to the new charger, which is located at the curb. The installation process is much quicker than the average curbside charger, even though they still have to get the appropriate permits from the city. The chargers are also separately metered so that the electrical usage can be billed separately and paid to the utility by it's electric.

it's electric chargers are all Level 2 and available to the public 24/7 all year. The chargers have been carefully designed to blend better with cityscapes by occupying less square footage and visual space, and to be tough enough to survive being located at the

curb. it's electric is also the first U.S. company to apply a smart design principle that works in Europe: detachable cables (also known as the bring your own cable (BYOC) model).

it's electric owns, operates, and maintains the chargers at no cost to the property owner. In fact, it's electric offers a revenue share with the property owner. Through their initial partnerships, it's electric is learning that property owners enjoy that they don't have to manage the parking for chargers. The revenue share for host property partners is $0.06/kWh. This comes out to between $700-$3400 (based on utilization) per year per charger that goes back to the property owner.

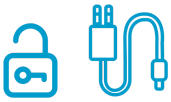
For the driver, the process is simple. Drivers download the it's electric app, join the network, and request a cable, which it's electric provides at no cost to the driver. Each driver receives their own charging cable with a connector that matches their vehicle, which can be attached to it's electric's chargers. Importantly, their model does not require a membership. Once the driver receives their cable, they can charge at it's electric chargers. Pricing of charging varies by city. The price is set by it's electric and the city where the charger is located, and they typically recommend a time-based pricing model with time-of-use rates. This creates both an incentive to unplug the car when it's done charging and encourages overnight charging by offering a lower nighttime rate. For the first it's electric charger installed in Boston, charging costs $1.50 per hour at night (9 pm-6 am) and $3 per hour during the day (6 am-9 pm).

Elements for Success

- By **leveraging existing buildings** to power charging, it's electric eliminates time-intensive and costly steps to install chargers. Additionally, their ability to approach property owners with a simple, cost-beneficial solution helps convince building owners that EV charging is an asset.
- The **detachable charging cable** is designed for cities, where vandalism is often a concern, because charging cables left outside are at risk. With a detachable cable, it's electric doesn't have to provide multiple connector types on the chargers themselves. What's more, it's electric designed their chargers (including the detachable cable) specifically for the city curbside. The chargers are low-profile and sleek, so they blend seamlessly with cityscapes.

REFERENCES

- it's electric
- These Startups Are Finally Bringing EV Chargers to America's Cities - WSJ
- Breaking Barriers: A Startup Changes The Game For EV Charging In Cities
- Boston and its electric launch the next generation of Urban EV charging

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Equipment	 Technology

Charger type: Level 2 charging

UTILITY SOLUTIONS

PENINSULA CLEAN ENERGY

Low-Power EV Charging

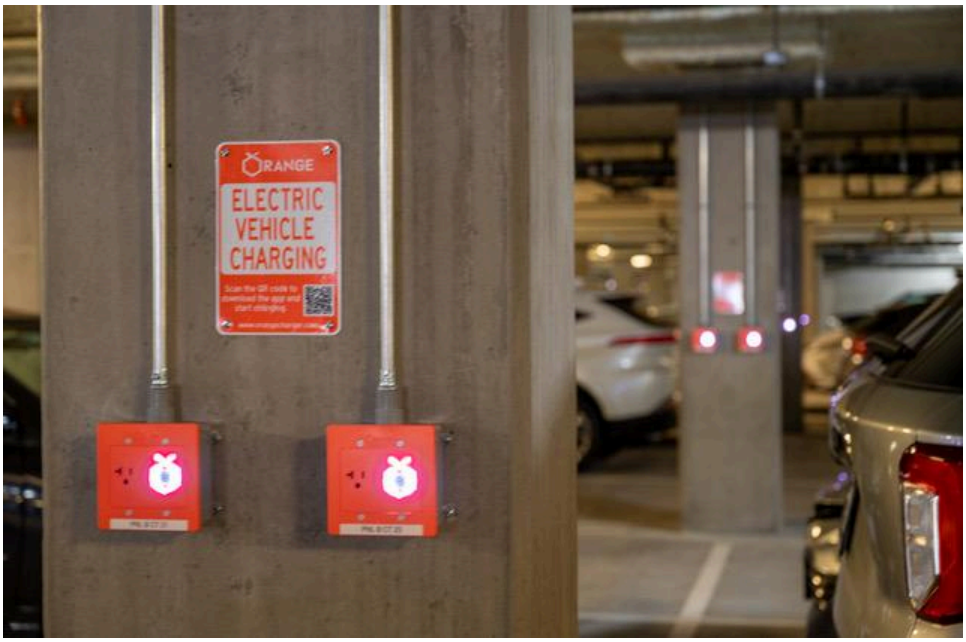
CHALLENGE

Residents of multifamily housing are a critically underserved population when it comes to accessible EV charging. These properties have unique challenges, such as the need to serve many residents, limited electrical capacity, and uncertainty about when residents will switch to EVs.

Most EV drivers travel around 40 miles a day and leave their cars parked for at least 12 hours daily. Installing Level 2 charging, which can recharge a full EV battery in about 4 hours, in apartments and condominiums can require expensive panel upgrades. Recouping these costs drives up per-kWh charging rates for multifamily housing residents and often leads to shuffling vehicles between parking spaces since Level 2 charging for daily use often takes an hour or less. Is there an inexpensive, low-power solution that creates a better fit for EV charging schedules and enables property owners to afford larger EV charging projects?

OBJECTIVES AND SOLUTION

Peninsula Clean Energy (PCE), a community choice aggregator that sources clean energy for residents in California, aims to reduce the cost of charging installations for landlords and the per-kWh cost of charging for residents. PCE's **EV Ready program** provides free technical support and incentives to landlords and property managers who add EV charging to their properties. When property owners seek technical assistance, PCE offers three design options–"good, better, and best"–and the "best" option typically includes the least expensive, lowest-level chargers. Many EV drivers and intenders assume that they need a Level 2 charger (typically 7 kW) to charge their EV. However,



according to PCE's self-published report on the results of their managed charging pilot, about ⅓ of residential EV charging already utilizes a typical 120V outlet.

For daily driving, Level 1 chargers are completely adequate and cost very little to install. They also complement typical parking behaviors in which drivers park their cars in the evening and don't move them until they head out the following day. When program participants reach out to PCE to get a quote on costs and incentives for installing Level 2 chargers, PCE will provide that information, but will often recommend more chargers that work at a lower power level as their "best" option. Instead of the upsell costing more, the recommendation provides more chargers for less money. Not only can the cost savings from these projects ultimately reduce the cost of charging in multifamily housing, but they can also serve more drivers, make charging more convenient, and reduce the impact of charging on the grid.

A recent EV Ready Success Story shared by PCE highlights the fact that an increasing number of prospective renters are asking about EV charging. In response to this demand, Tyrone Properties installed 13 Level 1 and low-power Level 2 chargers for their tenants. With the help of incentives from the EV Ready program, total out-of-pocket costs were less than $150 per charger. Additionally, when possible, the chargers are wired directly to the resident's apartment's electric meter. This allows customers to take advantage of utility-offered EV rates and time-of-use residential rates that make the grid cleaner and more efficient and reduce the cost of electricity. PCE has installed more than 1,600 chargers so far and has 3,000 more in progress. About three-quarters of these support people living in multifamily housing.

Elements for Success

- Peninsula Clean Energy is uniquely positioned as a **special-purpose public agency** and a non-profit to meet the charging needs of residents.
- PCE offers **cheaper rates** than the investor-owned utility whose territory in which it resides. Because there are no shareholders, everything they make from selling power is invested in electrification programs.
- Savings from the **increased efficiency** of the system put downward pressure on rates.
- PCE's focus on "right sized" EV charging is allowing for larger sized projects at affordable costs for property owners.

REFERENCES

- PCE EV Managed Charging Pilot Results
- Access to slow EV chargers could speed up EV adoption among renters
- Peninsula Clean Energy EV Ready Program
- EV READY SUCCESS STORY Tyrone Properties adds EV charging at low to no cost

Tags		
Charging type	Problem addressed	Solution type
 Public or Private	 Access, Cost	 Utility

Charger type: Level 1 and Level 2 charging

AVA COMMUNITY ENERGY

Public Fast Charging Network

CHALLENGE

While electric vehicles don't emit carbon dioxide, the energy that powers them may come from non-renewable sources. Single-family homeowners can install solar panels and power EVs with 100% renewable energy, but most residents of multifamily housing don't have this option. How can multifamily housing residents access public EV charging powered by renewable energy?

OBJECTIVES AND SOLUTION

Ava Community Energy is a community choice aggregator in California, a nonprofit community government agency. It builds–and buys from–clean power plants to provide electricity to Pacific Gas & Electric, an investor-owned utility company that delivers the electricity to customers. Ava Community Energy returns excess revenue to the communities it serves, including Alameda County and the City of Tracy.

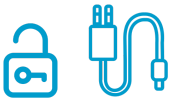
Ava Community Energy decided to build public EV chargers because a large percentage of greenhouse gas emissions come from transportation in their service territory. They also realized that access to fast and reliable charging is a critical barrier to EV adoption, especially for residents of multifamily housing. Their first 31 public charging stations are located at City Center West Garage in downtown Oakland, an area with lots of multifamily housing and businesses nearby. Drivers can see current charging prices on the PlugShare or EV Connect apps and pay for charging with a credit or debit card, mobile wallet, or through the EV Connect app. Parking fees are waived at the garage for the first hour of charging. Ava Community Energy is also collecting customer feedback surveys from their current charging location to better inform future charging projects. This solution allows multifamily housing residents to charge with renewable energy in a convenient and affordable way.

Elements for Success

- DC fast charging is provided **directly from the electric utility**, which makes the installation process smoother and ensures the cost of charging is affordable.
- The public chargers are powered by **renewable energy**, giving all drivers more choices for how they charge.
- The 31 public chargers range from 100 to 280 kW, allowing drivers to **charge quickly** and minimize parking fees.

REFERENCES

- EV Fast Charging Network - Ava Community Energy
- What We Do | Ava Community Energy

Tags		
Charging type	Problem addressed	Solution type
 Public	 Access, Equipment	 Utility

Charger type: DC fast charging

BURLINGTON ELECTRIC DEPARTMENT

Pole-Mounted EV Chargers

CHALLENGE

For EV drivers in Burlington, VT, a city-wide goal of reaching Net-Zero Energy by 2030 helps drive creative solutions for EV charging for multifamily housing, including affordable housing. Burlington's municipal electric utility boasts 100% renewable energy and continues to drive solutions toward sustainable electrification. Consistent with the utility's mission, Burlington Electric Department (BED) has identified a creative solution to address access and affordability of EV charging for drivers living in multifamily housing who do not have access to off-street parking. Indeed, one appreciative customer shared the following thoughts: "I've been really happy overall with the pole-mounted chargers – they've been super convenient, and I honestly can't say enough good things."

OBJECTIVES AND SOLUTION

BED identifies neighborhoods with high numbers of vehicles parking on the streets. Then, BED prioritizes those neighborhoods for the rollout of affordable EV charging and installs Level 2 EV chargers on curbside utility poles.

These utility-owned and operated chargers are installed 10 feet up on the poles to save space at street level and prevent damage from snow plows and other sources., Using the ampUp app, an EV driver can either scan a QR code on the pole or select the charger from the ampUp map, to trigger the charging cable to descend for easy charging. Not only is the charging convenient, but it's also affordable, at $0.13 per kilowatt-hour (midnight to noon) and $0.21 cents per kilowatt-hour (noon to midnight). With these new chargers, all Burlingtonians, whether homeowners with space for a Level 2 charger on their property or multifamily renters with no off-street parking, have the opportunity to take advantage of the lower, off-peak charging rate.

BED is studying how well these chargers work and, if this pilot program is successful, will look to install more in additional neighborhoods where residents live in apartments without access to off-street parking. The program is also designed to include residents who live in affordable housing. BED suggests that utilities interested in exploring this technology test both the user interface with the app and the durability of the charging hardware.

Elements for Success

- BED is not only providing access to charging for EV drivers, but is also identifying and **providing access in areas where it is most needed.** By prioritizing neighborhoods where residents do not have access to off-street parking, they are ensuring that the impact of each pole-mounted charger will be maximized.
- BED selected a **unique charger configuration** that will deter damage to and vandalism of charging cables and use existing utility infrastructure rather than adding new equipment in the curbside area, resulting in easier and quicker installs with no ground site-work.

REFERENCES

- How Burlington hopes to make EV chargers more accessible
- Burlington Electric Department introduces new pole-mounted electric vehicle chargers to improve charging access

Tags		
Charging type	Problem addressed	Solution type
Public	Access, Equipment	Utility

Charging cost: $0.21/kWh (noon to midnight) or $0.13/kWh (midnight to noon)

CASE STUDY MATRIX

Selected Qualitative & Quantitative Data

You can also view the entire case study matrix online.

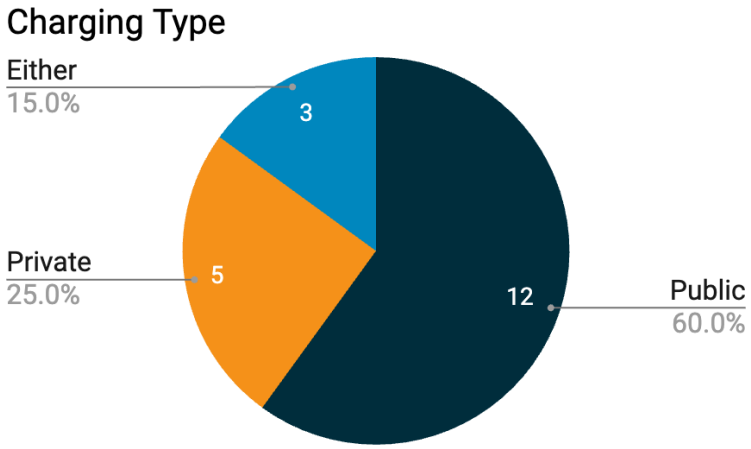
Case Study name	Project title	Charging type	Problem addressed	Solution type	Charging location	Charger type
Burlington Electric Department	Pole-Mounted EV Chargers	Public	Access, equipment	Utility	Curbside	Level 2 charging
City of Cambridge	Sidewalk EV Charging	Private	Access, equipment	Policy	Curbside	Level 1 charging
EV Match	Charger Sharing	Private	Access	Technology	Residential property	Varies
Stak Mobility	Pittsburgh Charging Carousel	Public	Access, equipment	Technology	Residential or commercial property	Level 2 charging
Electric Nation	Inter-Tribal Charging Community	Public	Access, cost, equipment	Community	Varies	DC fast charging, Level 2 charging
City of Ann Arbor	Commercial EV Charger Program	Public	Access, cost, equipment	Policy	Residential or commercial property	Level 2 charging
Peninsula Clean Energy	Low-Level Charging	Public or private	Access, cost	Utility	Residential or commercial property	Level 1 and Level 2 charging
Revel	Public Charging and All-Electric Rideshares	Public	Access	Technology	Commercial property	DC fast charging
Ava Community Energy	Public Fast Charging Network	Public	Access, equipment	Utility	Commercial property	DC fast charging
GoForth	EV Carshare Program	Public	Access, cost, equipment	Community	Residential property	Level 2 charging
Green Edge Tech	Equitable EV Charging Access	Public	Access	Technology	Curbside	Level 2 charging
SWTCH Energy	Enhanced EV Charger Management	Public or private	Access, equipment	Technology	Residential or commercial property	Varies
City of Boston	Public Curbside EV Charging	Public	Access	Policy	Curbside	Level 2 charging and DC fast charging
Dunamis Charge	Community-Driven Charging	Public	Access, equipment	Community	Commercial property	Level 2 charging
Fermata Energy	Vehicle-to-Grid Charging Pilot	Private	Access, cost, equipment	Technology	Residential property	DC fast charging
Amperage Capital	EV Infrastructure Investment	Private	Access, equipment	Technology	Varies	Varies
it's electric	Curbside Charging With a Twist	Public	Access, equipment	Technology	Curbside	Level 2 charging
Volta Charging	Convenient Public Charging	Public	Access, cost	Technology	Commercial property	Level 2 charging
Ecology Action	Charging Incentives and Installation Assistance	Public or private	Access, equipment	Community	Varies	Level 1 and Level 2 charging
Charge Vermont	State Incentives for Multi-Family Housing	Public or private	Access, cost	Policy	Residential property	Level 1 and Level 2 charging

Case Study name	Funding Source	Installed by	Location	Average charging cost	Utility upgrades needed	# of active chargers
Burlington Electric Department	State grant	Local utility	Burlington, VT	$0.21/kWh (noon to midnight) or $0.13/kWh (midnight to noon)	Yes	5
City of Cambridge	N/A	Driver or building owner	Cambridge, MA	Market rate	No	N/A
EV Match	N/A	Driver or building owner	Nationwide	Above market rate	N/A	Over 1,000
Stak Mobility	Private investment	Stak Mobility	Pittsburgh, PA	Varies - monthly subscription	Unknown	210
Electric Nation	Federal grant	Varies	MN, ND, SD	Varies	Varies	Unknown
City of Ann Arbor	City grant	Electrical contractor	Ann Arbor, MI	Market rate plus transaction fee	N/A	Unknown
Peninsula Clean Energy	Utility program	Electrical contractor (have list of partners or can select own)	San Mateo, CA	Usually above market rate	Varies	Over 1,400
Revel	Private investment	Revel	New York City	$0.54/kWh	N/A	64
Ava Community Energy	Private investment	Ava Community Energy	Oakland, CA	Varies, parking is free for one hour	Unknown	31
GoForth	Multiple grants	Electrical contractor	Nationwide	$5 per hour or $50 per day for car rental (charging alone is generally a 10% premium above utility rate)	Varies	21 locations
Green Edge Tech	State grant, mandated utility grant	Green Edge Tech	Pittsburgh, PA	$1 to start, $0.35/kWh after	N/A	5
SWTCH Energy	State and utility grant	SWTCH	Beacon, NY	$0.39/kWh	No	10, 173 unit building
City of Boston	Private investment	itselectric, Greenspot, Flo	Boston, MA	$0.35/Kwh	Unknown	At least 58
Dunamis Charge	Utility grant	Vendors	Detroit, MI	$1.50 per hour	Varies	At least 80
Fermata Energy	Private investment	Fermata Energy	Boston, MA	Free for driver	No	1
Amperage Capital	Private investment	Contractors	Nationwide	Varies	Varies	Unknown
it's electric	Private investment	it's electric	Nationwide	Varies - Boston site: $1.50 per hour at night (9pm-6am) and $3 per hour during the day	No	6
Volta Charging	Advertising revenue	Shell Recharge USA	Nationwide	Typically free	N/A	Over 2,000
Ecology Action	State grant	Ecology Action	Santa Cruz, CA	Varies	Varies	Over 600
Charge Vermont	State grant, EV registration fees	Varies	Vermont	Varies	Varies	78

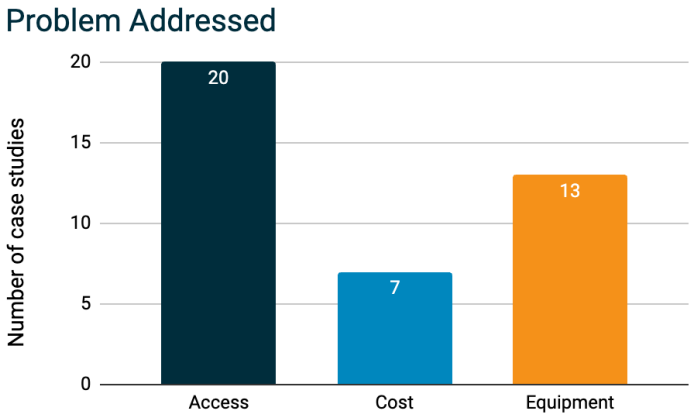
ANALYSIS

This report's tagging system and matrix show the diversity of charging solutions available to multifamily housing residents. Which project elements are most prevalent in these case studies and the most replicable for future solutions?

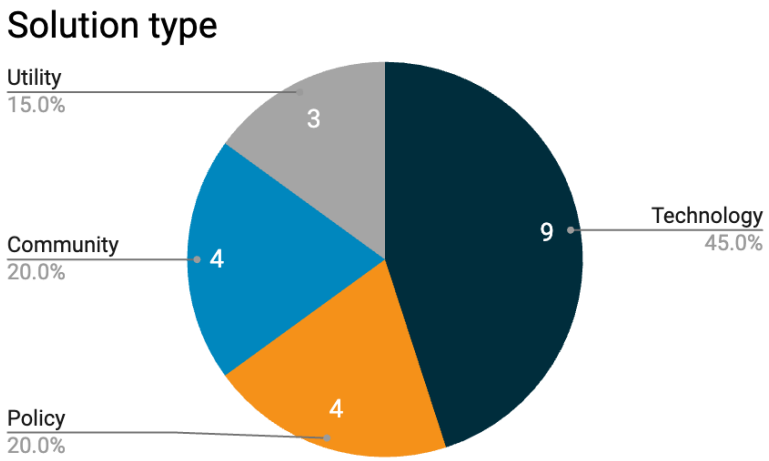
The greatest number of projects increased or supported public charging, with an additional 3 projects supporting both public and private charging. Public charging can support entire communities and reduce the need to install chargers at every property, which is often cost-prohibitive.



All 20 case studies improved access to charging options. Only 7 case studies deliberately focused on lowering the cost of charging, which is still a persistent issue since public charging often passes on additional fees to drivers and can be more expensive than home charging. More than half of the case studies made equipment more feasible to install and use, an important consideration for any charging solution.

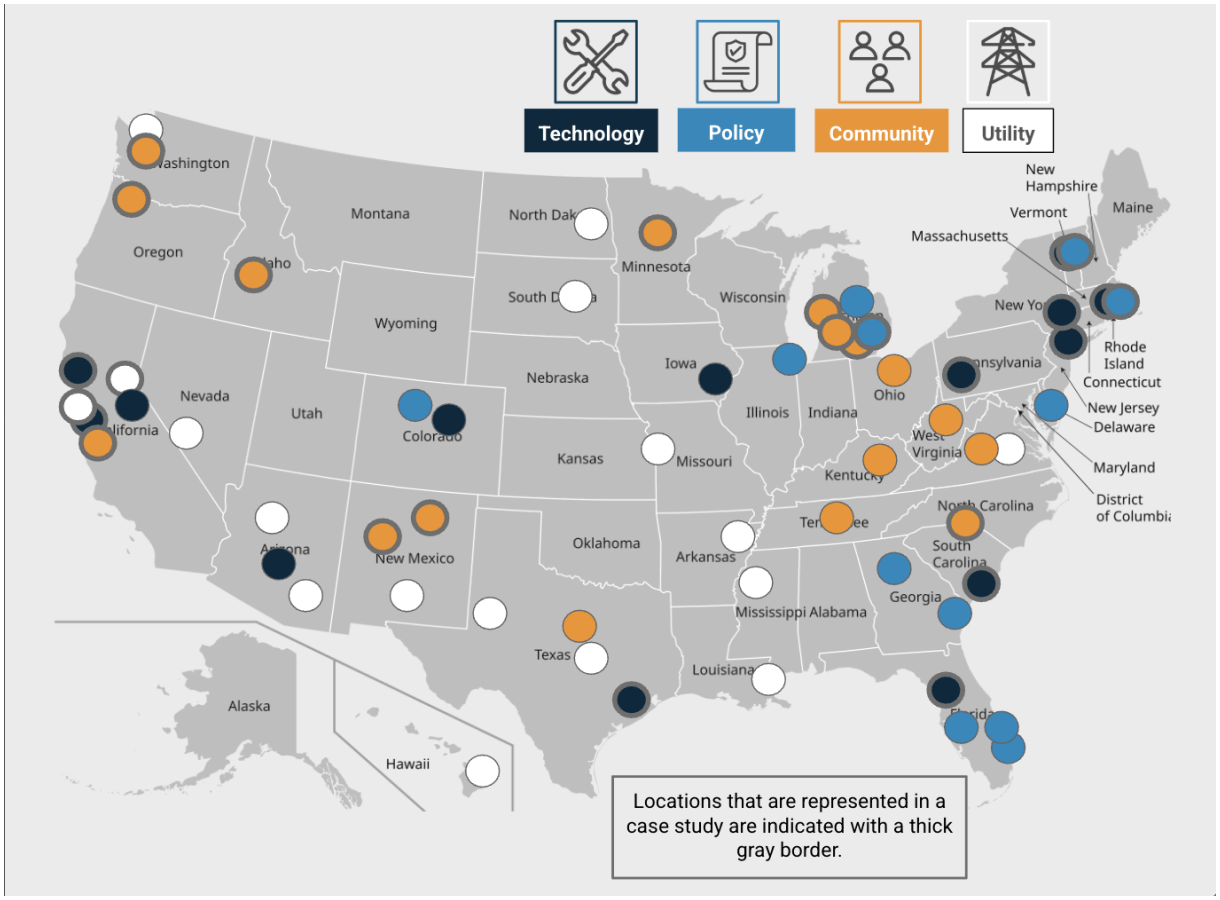


Technology was the most common solution type since EV charging is becoming more desirable and profitable for technology companies. Technological solutions are successful at bringing convenient and innovative charging solutions directly to EV drivers. Policy solutions came from government programs in states and cities, and their unique perspective can make the charging



installation and management process easier for building managers and EV drivers. Community organizations were well-represented in our case studies, and their projects have been successful due to their close attention to the needs and desires of their communities. Electric utilities across the country are assisting with the buildout of charging networks, and their knowledge of the grid and charger management has been very helpful to building managers. Any successful long-term and large-scale EV charging project should take inspiration and advice from all four of these stakeholder groups, which can each contribute a unique perspective for a robust charging solution.

Looking for more examples of utility, community, and policy approaches to EV charging access? We compiled a map (next page and online) and spreadsheet that lists creative solutions from across the country, including our own 20 case studies and many more projects. Solutions are available in almost every state, and many more are in the works from cities, community groups, and utilities.



Find descriptions and more details about each location [in this spreadsheet](#).

BEST PRACTICES

Recommendations for future multifamily housing charging initiatives based on the successes of the case study projects.

BEST CHARGING SOLUTIONS

Consider Level 1 charging.

Most drivers considering an EV assume they need a purpose-installed charger to power their EV, but over 20% of the EV drivers we've surveyed rely on a simple 120V outlet to charge their car. That's the same type of outlet people use to plug in a simple lamp, a toaster, or a laptop. While charging on a regular outlet takes more time, that can be a good thing. A Level 2 charger typically takes between 2 and 4 hours to top up an EV battery. This is great if you are in a hurry, but if you are charging overnight, the last thing you want to do is move your car in the middle of the night because it has finished charging. Aligning dwell time (how long your car is parked in a particular location) and charging speed can make driving an EV more convenient. Plus, Level 1 charging costs much less to install and minimizes impacts on the grid.

Make public charging convenient and accessible.

In order for public EV charging to be a viable alternative or addition to home charging, chargers should be located in multiple areas within a neighborhood. Chargers should be placed in residential areas (ideally within a 5-minute walk of multifamily housing residences) and at frequently visited community spaces, such as grocery stores, places of worship, and movie theaters. The ultimate goal is that EV charging is readily available where cars are parked, so that drivers can charge where they live, work, shop, and play. Community residents, whether EV drivers or not, should give input on proposed public charging locations to ensure that charger buildout is informed by the community and aligned with community needs.

Look for incentives to support charging installation.

Multifamily property owners and managers should take advantage of the numerous state, local, and utility grants and rebates designed to greatly reduce the upfront cost of charger installation. These incentives can sometimes be combined to offer even greater savings. Additionally, many utility companies, state and local governments, and community groups offer free assistance with the entire process of installing EV chargers, from applying for incentives to charger management.

Prioritize business models that reduce costs.

We discovered a few case studies that highlighted creative business models allowing public EV charging to cost the same (or less) than home charging. Affordable charging makes driving an EV much cheaper than driving a gas car and ensures the cost, convenience, and climate benefits of driving an EV are available to those who need them most. Sometimes, EV charging installations become so complex and expensive that the charging they provide is no longer

affordable. Examples like Fermata and Volta offer unique solutions that create a separate value proposition for the charger that offsets the cost of the electricity itself.

Implement load management and vehicle-to-grid charging for long-term planning.

An increase in electric vehicles means greater demand for electricity, which can cause high electricity prices at peak charging times. Many utilities offer discounts for charging at times when there is low demand or for discharging electricity from EVs back into the grid or the building. These practices will enable building managers to continue to add EV chargers without straining the grid and save money on electricity costs.

Utilize car sharing for a low-cost, low-risk mobility solution.

Car sharing allows drivers to enjoy the cost savings of driving an electric vehicle without having to purchase a car upfront. It is a perfect solution for drivers who want to try the EV experience in a low-risk environment, and it makes convenient mobility accessible for those who do not want the responsibility and cost of owning a car. EVs make great carshare vehicles because they require minimal maintenance and have low operational costs, and they bring opportunities for charging to residential communities.

BEST STRATEGIES FOR SUCCESS

Take advantage of stackable incentives.

Incentives for installing charging stations are available from various sources, including the federal government, state governments, utilities, and others. The best thing about these incentives is that in many cases, they are stackable, meaning you can add them together. For example, federal tax credits can cover up to 30% of the cost of charging equipment and installation. This can often be paired with utility incentives such as rebates, free chargers, or reduced charging rates.

Save money with upfront incentives.

For property owners and managers, coming up with cash for installing EV charging equipment can be a challenge, and often rebates take weeks or months to be issued after construction. Programs like Charge Vermont offer most of the funding for the installation once contracts are signed, but before construction begins, which saves the property owner the trouble of securing financing and the additional cost of paying interest on a loan.

Involve your local utility.

Installing EV charging equipment can require utility infrastructure upgrades, which can be expensive and time-consuming. The earlier the utility is engaged in the project, the better. This allows the utility time to ensure adequate capacity on transformers. Some utilities also offer to-the-meter (TTM) upgrades, which cover the cost of additional infrastructure investments to

accommodate the increased load of EV charging. Utilities can also be a great resource for information about equipment, contractors, and incentives.

Involve local property owners and residents to create mutually beneficial solutions.

Direct outreach to property owners or managers is the best way to convince them to install EV chargers for their residents. If residents express interest in chargers, property managers are more motivated to start the installation process. Outreach to property managers from utilities and community groups also facilitates conversations about charger installation, and these groups may provide new and useful information to property managers.

Consider short-term stopgap charging solutions.

Building out a robust public and private charging network takes time. However, there are measures that municipalities and companies can take to satisfy the immediate charging needs of EV drivers. Charger sharing apps can connect drivers without home charging to convenient charging options, and sidewalk charging accommodations like mats and swing arms can be replicated almost everywhere. Communities looking to build a supportive ecosystem for EV drivers should support both short-term and long-term charging solutions.

Prioritize underserved communities and affordable housing locations.

Low-income communities stand to gain the most from the cost savings and cleaner air associated with EV adoption. However, they are often the most overlooked for investments in charging infrastructure. Cities, states, companies, utilities, and organizations should prioritize low-income communities and affordable housing for charging investment and development, and engage communities in the planning process to best support their communities' needs.

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ABOUT PLUG IN AMERICA

Plug In America is the nation's leading nonprofit organization dedicated to accelerating the use of plug-in electric vehicles in the United States through education, advocacy, and research. Formed in 2008, Plug In America provides practical, objective information to consumers and dealerships about EVs through various programs, including National Drive Electric Month, Drive Electric Earth Month, PlugStar.com, and other public outreach events. Learn more at PlugInAmerica.org.